

# Japanese Society of Neuro-Endovascular Treatment Specialist Qualification System. Six Years' Experience and Introduction of an Animal Model Examination

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## Introduction

Recent advances in devices and materials, and therapeutic technical improvements in interventional neuroradiology practice make it possible to use this therapeutic method for the treatment of neurovascular disease. In view of the spread of this treatment and increasing numbers of the procedures, there is a social demand to maintain a certain therapeutic quality. One of the methods used to present the therapeutic quality of doctors to the public is technical and knowledge authorization by an official organization or society. According to the ideas of the Japanese Society of Neuro-Endovascular Therapy (JSNET) "The basic therapeutic standard should be secured by the Society to avoid unnecessary complications which are caused by improper techniques and immature experiences." JSNET start to develop a Specialist Qualification System in 1997, and the first examination was held in 2002. Details of the development of the system and the requirement of specialists have previously been reported<sup>1</sup>.

It has been ten years since development of this system and we have had eight examinations since 2002. Following six years of experience and two years of examinations using an animal model, we would like to introduce the JSNET Specialist Qualification System.

## JSNET specialist qualification system

### 1. Class of Specialist

We have two classes of specialist: consulting specialist and specialist. A consulting specialist is a senior specialist who must already be qualified as a specialist. A consulting specialist is eligible for election as a JSNET board member of the Specialist Qualification System and may also train the specialist in a training institute. Application details for the specialist and consulting specialist are described below.

### 2. Members of the board

Board members are elected by the society members every two years. To date we have had three elections, held in 2004, 2006 and 2008. In addition, several members are nominated by the committee chairman.

### 3. Application for specialist: requirements

#### 3-1: Training

Applicants for the specialist qualification are required to have more than six years of training in neurosurgery or neuroradiology after graduate medical school. This must include more than one year of training in endovascular treatment under the supervision of a consulting specialist.

From 2008, applicants must be board certified doctors in neurosurgery, radiology, emer-



Figure 1 Picture of a test examination paper.

gency room(ER), neurology or internal medicine. This is because JSNET has joined the Japanese Board of the Specialties, and our specialty is authorized. Applicants therefore need a basic specialty qualification to be considered for the JSNET specialist qualification. Duration and program of the training is the same as before 2008.

### 3-2: Experience of endovascular treatment

Applicants must have been involved in more than 100 cases of endovascular treatment with a specialist or consulting specialist as the operating surgeon, or as first or second assistant, and should have been the operating surgeon in at least 20 of these cases. The applicant is also required to have been involved in a minimum of 20 cases of aneurysm embolization, 15 cases of revascularization or angioplasty including carotid stenting, and five cases of arteriovenous malformation (AVM) or dural arteriovenous fistula (dAVF).

### 3-3: Other requirements

Applicants are required to have been members of JSNET for more than four years, and

have experienced over 300 cases of cerebral angiography authorized by their institute.

### 4. Application for consulting specialist

Consulting specialist applications are judged at a judgment council by the members of the board. The applicant must be a specialist with more than five years' experience. The applicant should also have published a minimum of three papers directly related to interventional neuro-radiology and more than ten presentations to the society or related society meetings are necessary.

### 4-1: Experience of the procedure

Consulting specialist applicants are required to have been the operating surgeons for more than 200 cases of endovascular treatment. Between 2000 and 2006 there was also a minimum requirement of 40 cases of aneurysm embolization, 20 cases of revascularization or angioplasty including carotid stenting, ten cases of brain or spinal AVM embolization, 20 cases of dAVF embolization and 20 cases of brain or head and neck tumor embolization.

In 2006, a specialist activity investigation into

endovascular treatment in Japan looked at reports from each specialist, and collected data from a total of 6661 procedures (Table 1). The investigation indicated a withdrawal rate of 153/317, or 48.3%. Following this investigation, the minimum number of required cases was re-set in 2007 to reflect the current surgical activity in Japan more accurately. The requirements are now: 40 cases of aneurysm, 30 cases of revascularization or angioplasty, five cases of brain or spinal AVM, ten cases of dAVF, and ten cases of brain or head and neck tumor. Yearly numbers of the applicants for the consulting specialist qualification and successful applicants are summarized in Table 2.

### 5. Examination

#### 5-1: Written test

The Specialist Qualification Examination begins with a written test, comprising 200 multiple-choice questions. Current consulting specialists are required to write questions for their allotted sections, based on scientific papers. Selections of the collected questions are made by the board members. The written test assesses knowledge in neuroendovascular treatment related fields such as neuro.anatomy, neurophysiology, neuropathology, neuropharmacology, basic radiology, instruments and devices. Case-orientated imaging-based questions about the target neuro disease of the intervention, such as aneurysm, brain and spinal AVM, dAVF, brain-spinal-head and neck tumor, trauma, cerebrovascular disease are also included (Figure 1).

After the written test, computer analysis of each question is performed and inappropriate questions (too difficult or too easy) or low discrimination coefficient questions are removed prior to marking. A sample of questions from the 2007 examination is listed in Table 3. These questions had a good discrimination coefficient.

#### 5-2: Oral test

Applicants also sit two 20-minute oral tests. These are case-orientated practical questions



Figure 2 Setting of DSA and operating table for animal (swine) using catheter handling test.

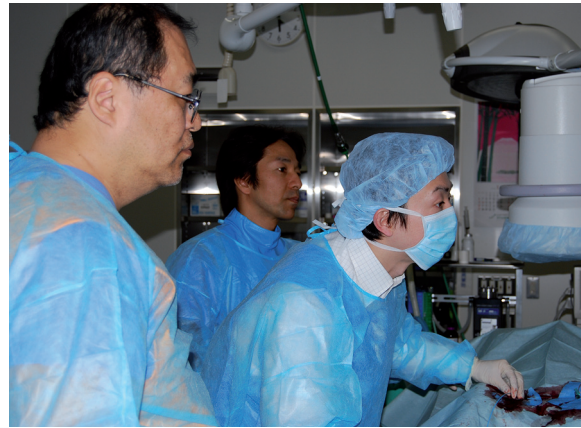
Table 1 Results of JSNET 2006 Activity Surveillance.

Procedure	Numbers	%
Non-Ruptured AN embolization	1447	20.3
Ruptured AN embolization	1460	20.5
subtotal	2907	40.8
AVM embolization	231	3.2
Spinal AVM embolization	71	0.4
dAVF embolization	511	7.2
Head & neck tumor	428	6.0
Others	138	2.0
Carotid Stenting	1342	18.9
Other Extracranial PTA/Stent	263	3.8
Intracranial PTA/Stent	324	4.5
Acute stroke	446	6.3
Embolization subtotal	4286	
Revascularization subtotal	2375	
Total	6661	100

Table 2 Numbers of the applicants for the Consulting Specialist qualification and successful applicants.

	2000	2001	2002	2003	2004	2005	2006	2007
Applicants	14	52	13	9	14	6	8	20
Successful	14	34	8	8	12	3	7	19





Figures 3,4 Pictures during the catheter handling test using an animal.

about the treatment and basic knowledge of a device, basic technique and proper handling of the device and materials on the table. Each applicant is assessed by two examiners. Actual

questions from an oral session held in 2007 are listed in Table 4.

Table 3 A sample of questions from the 2007 examination.

1. Which are the wrong ways to decrease the irradiation dose to the patient during the procedure? Select two.
1) using low pulse rate fluoroscopy mode 2) procedure using enlarged fluoroscopy mode 3) shortening the patient-X ray tube distance 4) decreasing the X-ray tube current 5) using focused irradiation field
answers 2) 3)
2. Which is correct about heparin-induced thrombocytopenia?
1) onset immediate after the heparin injection 2) onset when using low-molecular heparin 3) onset from thrombotic complication 4) recovery immediate after stopping heparin 5) onset from subcutaneous hemorrhage or thrombocytic purpura
answer 3)
3. Which arteries or veins (sinus) pass through the hypoglossal canal? Select two.
1) persistent proatlantal artery type I (intersegmental) 2) ascending pharyngeal artery 3) inferior petrosal sinus 4) marginal sinus 5) anterior condylar vein
answers 2) 5)

5-3: Practical test

From the start of the development of this qualification system, the most important question was “How do we evaluate the practical technique?” We introduced a practical test whereby two examiners visit the applicant’s hospital on a specific day and evaluate and judge the treatment strategy, skill and technique. However, although the observation of the procedure was limited, we are concerned that the test may place unnecessary pressure on the applicant, thereby affecting the procedure itself and/or decision-making during the procedure.

The committee has subsequently been searching for a better method for evaluating the applicant’s practical technique, and has concluded that the initial steps of the procedure, such as microcatheter assembly, catheter guidance and identification of the target area, can be tested using an animal model. Residual

Table 4 Actual questions from 2007.

1) Knowledge about detachable coils
2) How to shape the tip of microcatheter (braided)
3) Assembly of occlusion balloon for neck-plasty (Hyperform)
4) Exchange of RX balloon catheter to OTW balloon catheter using a 300cm long guide wire
5) Assembly of a goose neck snare for retrieving a migrated coil

issues to be solved are the number of animals needed by 90 applicants over two days, the cost, and where the procedures can be performed.

#### 5-4: Animal test

In 2006, we changed the location of the examination from Osaka to Kobe, where the animal laboratory is located near the examination venue. The animal (swine) model catheter handling test using DSA and fluoroscopy has been installed. Using three sets of DSA, microcatheter and microguidewire assembly, insertion of the catheter into the internal carotid artery and navigation to a pointed small branch, and the application of a large GDC for vessel ligation could be tested within 20 min (Figures 2-4).

#### 5-5: Inspection

By introducing an animal model examination, the practical test was changed to an inspection. Before the inspection, a detailed treatment strategy and case information are e-mailed to the examiner, and if the case and procedure seem to be proper, a schedule is decided between the applicant and the examiner. An examiner visits the applicant's hospital and observes the procedure from start to end, and makes a report to the applicant and the com-

mittee after the inspection. Check points of the inspection are the same as for a practical test, including whether the strategy, skills and techniques are acceptable or not. Since it is not a test, the applicant can ask the examiner for advice about the procedure.

#### 5-6: Statistics of the examination

The statistics of the specialist examination are summarized in Table 5, and the sections of the specialist examination year by year are summarized in Table 6.

#### 6. Re-registration

A re-registration system for the consulting specialist and specialist qualifications started in 2007. Every five years specialists and consulting specialists will be requested to provide procedure activity reports for 50 and 100 cases, respectively, to continue their specialties. Some specialists had changed their profession at the initial re-registration or had abandoned this title because they did not meet the required activities. The suitability of these numbers, 50 and 100 cases, is not concluded because re-registration has just started. The re-registration system will be reviewed in the near future in relation to the total numbers and balance of new and retired specialists.

**Table 5 Specialist qualification examination statistics from 2002 to 2007. Some practical tests were delayed to the next year. Written test qualified applicants were allowed to take the oral examination three times.**

	2002	2003	2004	2005	2006	2007
Applicants	160	99	83	120	88	82
Paper test passed	130	76	48	72	50	62
Oral test passed	112	56	41	68	64	57
Final successful	109	55	39	72	64	56
Final successful %	68.1	55.6	47.0	60	72.7	68.3

**Table 6 Specialist qualification examination chart year by year.**

	2002	2003	2004	2005	2006	2007	2008
Oral (case)	3	1	1	1	1	1	1
Oral (device)	1	2	2	2	1	1	1
Animal labo					*	*	*
Practical test	*	*	*	*			
Practical inspection					*	*	*

### 7. Significance of the title to the public

In May 2006, the Japanese Society of Neuro-Endovascular Treatment (JSNET) joined the Japanese Board of Medical Specialties, meaning that JSNET became an officially recognized society in Japan. From February 2008, we can advertise this professional title to the public such as hospital gate or homepage, etc. In fact, carotid stents for carotid stenosis will be covered by medical insurance from April 2008, and this title is one of the requirements requested by the Japanese government. In the future, clinical trials, new treatments or new device introduction in Japan might be considered based on this title. The standard of the specialists must therefore be maintained to meet these guidelines.

### 8. Future considerations

We need to brush up devising written test questions, and determine a better and more precise practical examination. We need to consider the use of animal models as part of the examination process, and how accurately these can represent actual procedures such as coil embolization in an aneurysm model.

JSNET now has over 2200 members and a total of 443 specialists, or about 20%. One of the current questions is "How many specialists do we need in Japan?" Also, should we main-

tain set percentages of the members or expand naturally? We have not yet answered this question. This issue is also related to the re-registration system, and the balance of new and retired specialist members.

### Conclusions

We have introduced a JSNET specialist qualification examination system following six years of experience. The JSNET will continue to refine the specialty system and aim to provide better IVNR treatment in Japan.

### References

- 1 Taki W, Gotoh K et Al: The first specialist qualification examination of the Japanese Society of Intravascular Neurosurgery (JSIN). *Interventional Neuroradiology* 8: 343-345, 2002.

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